Patent Claims:

1. A refrigeration plant of modular design (11) (refrigeration set, secondary cooler), which includes one or more liquefiers (3), supercoolers (6), two-stage evaporators with integrated liquid supercooler and suction steam superheater (4/5), injection valves (2), refrigerant compressors (1), frequency converters (10), lines, refrigerant and auxiliary refrigeration substances (9), characterized in that on account of the modular design (11) the reliability of the refrigeration system is higher, the refrigerant compressor (1) covers peak power by means of the frequency conversion (10), the power of the refrigerant compressors (1) is increased by the two-stage evaporator with multistage supercooling and suction steam superheating (4/5), the energy for refrigeration generation is saved and shifted (12), and the high operational reliability and availability of the refrigeration energy are achieved.

2. The refrigeration plant as claimed in claim 1, characterized in that a module (11) at the minimum comprises one refrigerant compressor (1), one liquefier (3), one two-stage evaporator with integrated liquid supercooler and suction steam superheater (4/5), one injection valve (2), lines, auxiliary refrigeration substances (9) and refrigerant filling.

3. The refrigeration plant as claimed in claim 1-2, characterized in that a supercooler (6) is connected upstream of the two-stage evaporator with integrated liquid supercooler and suction steam superheater (5).

4. The refrigeration plant as claimed in claims 1-3, characterized in that one or more condensers/liquefiers (7/8) for waste heat utilization is connected downstream of the refrigerant compressor (1).

5. The refrigeration plant as claimed in claims 1-4, characterized in that a module (11) (refrigeration set) or a plurality of modules (11) are assembled in parallel to form a refrigeration system.

6. The refrigeration plant as claimed in claims 1-5, characterized in that the refrigerant compressor (1) delivers the mass flow required for a defined refrigeration power via the frequency converter (10).

7. The refrigeration plant as claimed in claims 1-6, characterized in that the external supercooler (6) can be connected up and disconnected as a function of the demand for refrigeration.

8. The refrigeration plant as claimed in claims 1-7, characterized in that the refrigeration energy for the external supercooler (6) is temporarily stored (12).

9. The refrigeration plant as claimed in claims 1-8, characterized in that the refrigeration energy for the external supercooler (6) originates from independent sources (groundwater or others).

10. The refrigeration plant as claimed in claims 1-9, characterized in that the modular design (11) means that only a small number of items of equipment (9) and auxiliary refrigeration substances have to be used.

11. The refrigeration plant as claimed in claims 1-10, characterized in that the modular design (11) means that only a small quantity of refrigerant has to be used.

12. The refrigeration plant as claimed in claims 1-11, characterized in that the special modular design (11) means that there is no significant pressure drop in the

refrigeration line.

13. The refrigeration plant as claimed in claims 1-12, characterized in that the two-stage evaporator with multistage supercooling and suction steam superheating (4/5) can also be used as a separate unit in all other refrigeration plants (with refrigeration-transfer medium).

14. A method for operating the refrigeration plant of modular design (11) as claimed in one of claims 1-13, characterized in that the refrigeration powers and the COP value (ratio of energy input to energy output) are significantly greater at the refrigerant compressors (1).

15. A method for operating the refrigeration plant of modular design (11) as set forth in one of claims 1-14, characterized in that on one side a refrigeration-transfer medium (water, cooling brine or other media) flows through the first stage of the two-stage evaporation with multistage supercooling and suction steam superheating (4).

16. A method for operating the refrigeration plant of modular design (11) as set forth in one of claims 1-15, characterized in that a refrigeration-transfer medium (water, cooling brine, air and/or other media) flows through the liquefier/recooler (3).

17. A method for operating the refrigeration plant of modular technology (11) as set forth in one of claims 1-16, characterized in that a refrigerant is passed through one or more refrigerant compressors (1), liquefiers (3), supercoolers (6), two-stage evaporators with liquid supercooling and suction steam superheating (4/5) via injection member(s) (2), through the two-stage evaporator with liquid supercooling and suction

steam superheating (4/5) back to the refrigerant compressor (1), thereby maintaining a cycle.

18. A method for operating the refrigeration plant of modular technology (11) as set forth in one of claims 1-17, characterized in that the evaporation temperature, on account of the use of the two-stage evaporator with multistage supercooling and suction steam superheating (4/5), is very close to the outlet temperature of the medium that is to be cooled, and consequently is similar to that achieved in thermosyphon operation (flooded evaporator) and better than that achieved in dry expansion operation (dry evaporator).

19. A method for operating the refrigeration plant of modular technology (11) as set forth in one of claims 1-18, characterized in that the level of suction steam superheating can be raised up to the usable limit of the refrigerant compressor (1/22) by the use of the two-stage evaporator with multistage supercooling and suction steam superheating (4/5).

20. A method for operating the refrigeration plant of modular technology (11) as set forth in one of claims 1-19, characterized in that for a defined power there is always an identical mass flow through the two-stage evaporator with liquid supercooling and suction steam superheating (4/5) on both refrigerant sides (5).

21. A method for operating the refrigeration plant of modular technology (11) as set forth in one of claims 1-20, characterized in that there is a direct link (relationship) and an optimum for the evaporator power of the evaporator stage 1 (4/25) taking account of the supercooling (5/23) upstream of the injection valve (2) and the liquid fraction in the refrigerant at the outlet from evaporator stage 1 (4/32), which is

simultaneously the inlet to evaporator stage 2 (5/32). This liquid fraction on the evaporator side in the second stage (5/32) directly influences the level of supercooling in the second stage (5/23) of the refrigerant liquid. The process is designed in such a way that the power maximum is always to the benefit of the evaporation stage 1 (4/25), i.e. of the medium that is to be cooled (cf. diagram in Fig. 10).

22. A method for operating the refrigeration plant of modular design (11) as set forth in one of claims 1-21, characterized in that operation with two-stage or multistage supercooling (6/27) and operation only with internal supercooling (5/23/24) is provided. There is provision for operation with storage of the supercooling energy (Fig. 4; 12), in which only the internal supercooler stage (stage two) (5/23/24) is used and operation for peak load, in which the stored supercooler energy (12/27) can be deployed for liquid supercooling stage one (6/27) (liquid supercooling stage two (5/23/24) remains in operation) and therefore alone or together with the frequency conversion (Fig. 4; 10) to cover a peak load.